SustainCo
Sustainable Energy for Rural Communities

Intelligent Energy Europe Programme

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Pre-feasibility study template for nZEB pilot projects development

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The SUSTAINCO project

The SUSTAINCO project aims to support the ambitious European vision for the energy performance of its buildings. An important activity of SUSTAINCO will be to increase the visibility of front-runners, for both new build and/or renovation, with the aim of capacity and confidence building in the public sector. Most members of consortium are among the best known European energy agencies from Austria, Ireland, UK, Romania and Croatia, all of which have successful track records and numerous on-going or completed projects in area of sustainable buildings. Through focusing on key results from SERVE and other projects access to approaches, case studies and data to achieve cost optimum NZEB solutions will be highlighted.

SUSTAINCO is coordinated by:

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About this document

This document corresponds to *Task 5.2 NZEB pilot projects development*, Deliverable 5.2 *Basic project conceptual design with feasibility analysis for eight pilot project* of the SUSTAINCO project and should present a structure of pre-feasibility studies for eight NZEB projects implementation. It aims to give an overview of how SUSTAINCO project implementation is to be prepared and which technical and financial parameters to concern. This document was prepared in October 2014 by:

North-West Croatia Regional Energy Agency – Ivan Pržulj, Hrvoje Maras and Marko Vlainić

Intelligent Energy Europe

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About the study

This document provides a short step by step guide and suggested template on how to make a pre-feasibility study for implementation of a NZEB pilot project in your community. A pre-feasibility study is an initial evaluation and analysis of the potential of the proposed project which is based on extensive investigation and research to support the process of decision making. Feasibility studies aim to objectively and rationally uncover the strengths and weaknesses of existing systems but also to identify opportunities and threats present in the environment, the resources required to carry through, and ultimately the prospects for success. A pre-feasibility study has to take into account several factors which influence the investment, such as legal, economic, technological, environmental, scheduling and other factors. Rather than just diving into a project and hoping for the best, a pre-feasibility study allows project managers to investigate the possible negative and positive outcomes of a project before investing significant financial resources. The project should be based on integrated approach to energy efficiency and renewable energy actions while the whole process should be inclusive, open and constructive partnership between the consultant (project partner) and a representative of a local community. Each pre-feasibility study should be adapted to the chosen technological solution but it can also be modified to reflect needs and wishes of the partner city. A Pre-feasibility study is a short and concrete document that has to give clear answers to potential investors by conducting a quick technical and cost-effective assessment of the investment.

A general template with instructions is given in the following chapter.

1 Introduction

The introduction chapter should have the following aspects covered:

- Describe the purpose of the study, key outcomes and investing objectives (social, economic, technical or other objectives);
  This kind of retrofit are becoming usual in Catalonia in recent times, because it is a new tourist offer, it has been an interesting retrofit to execute isolated houses from ancient farms and convert them in rural hotels. For that reason, we have considered that could be an interesting example to develop with more detail and use it as a guide to set up in other places.
- Main data on the investor and his previous projects conducted in this area;
  Both owners and technicians were the most interested about knowing and applying the nZEB concept and also knowing the best and optimal way to apply renewable sources. The owner is a plumbing that had experience with renewable energies in his house; and the architects haven't done any building with efficient strategies until this moment.
- Methodological approach (explanation of techniques or applied software tool, who worked on the study, how you obtained the data, etc.).
  It is not possible realise a real assessment without knowing the real demand value (heating and cooling at least), to find it, it is necessary to use an especial program with a dynamic energetic simulator (in Spain, one program used is known as LIDER, and official program which add the state regulatory parameters from CTE). That was the first and main step to develop.

2 Analysis of the present situation

The building is retrofit to execute isolated houses from ancient farms and convert them in rural hotels in Santa Coloma de Queralt (Tarragona). This has a capacity for six rooms and The envelope conditions are approximately 250.00 m^2.

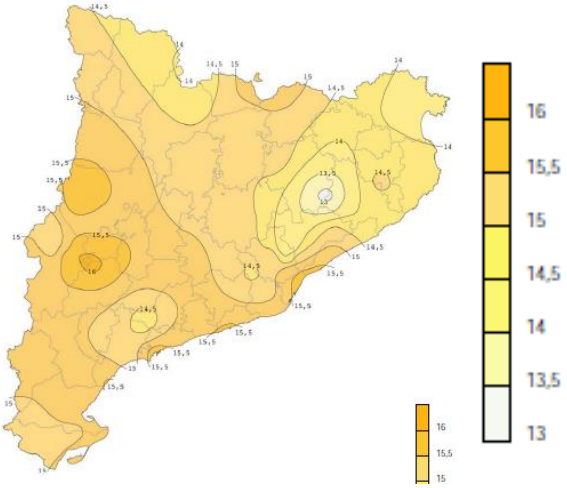
The original envelope conditions in the first design proposal are a conventional solution here in Catalonia, and the final demand of the building very high, after the mentoring the building reduce the thermal transmittances in a high percentage.

	thermal transmittances	
	initial	final
Average of the facade	1.2 W/m2K	0.25 W/m2K
Average of the windows	3.8 W/m2K	1.5 W/m2K

Weather conditions
Degree-day values for cooling and heating.

Municipi	Zona	Criteri		ANUAL	GEN	FEB	MAR	ABR	MAI	JUN	JUL	AGO	SET	OCT	NOV	DES
Bellcaire d'Urgell	7	calef.	**1515**	1529	331	238	179	117	52	13	0	4	19	80	192	304
		calef.	**1818**	2187	426	319	257	183	99	37	6	7	49	137	270	397
		refr.	**2121**	462	0	0	0	3	27	75	143	140	61	13	0	0

CODI ESTACIÓ	Paràmetres			Irradiació solar global diària (MJ/m²)											
	M (MJ/m²)	A (MJ/m²)	B (rad)	Gen	Feb	Mar	Abr	Mai	Jun	Jul	Ago	Sep	Oct	Nov	Des
AGONCI	14.82	9.62	3.25	5.95	8.71	13.04	17.96	22.03	24.17	23.78	20.92	16.44	11.53	7.50	5.45
AGULLA	14.09	8.38	3.37	6.77	9.57	13.52	17.74	20.97	22.36	21.51	18.60	14.52	10.31	7.12	5.82
ALCANA	15.03	8.79	3.34	7.23	10.07	14.18	18.63	22.10	23.68	22.92	19.98	15.74	11.30	7.87	6.37
ALCOVE	14.14	8.69	3.44	6.85	9.97	14.15	18.46	21.60	22.73	21.55	18.30	13.98	9.70	6.61	5.55
ALDEA	15.12	8.78	3.36	7.41	10.31	14.44	18.87	22.28	23.78	22.93	19.92	15.65	11.24	7.87	6.46
ALFACS	15.15	9.68	3.35	6.61	9.77	14.30	19.20	22.99	24.69	23.80	20.52	15.83	10.96	7.21	5.61
ALP	15.06	9.01	3.34	7.07	9.97	14.18	18.75	22.31	23.93	23.15	20.13	15.78	11.24	7.72	6.18
AMETLL	15.21	9.25	3.32	6.93	9.84	14.13	18.83	22.55	24.30	23.59	20.57	16.14	11.45	7.78	6.11
AMPOST	14.78	8.89	3.36	6.97	9.91	14.09	18.58	22.03	23.55	22.69	19.64	15.32	10.85	7.44	6.01
ANDORR	13.77	8.08	3.31	6.50	9.01	12.75	16.86	20.13	21.70	21.12	18.51	14.66	10.56	7.32	5.83
AVELLA	16.10	10.48	3.30	6.63	9.85	14.67	20.01	24.29	26.37	25.68	22.34	17.35	12.03	7.80	5.81
BALAGU	15.12	10.32	3.29	5.75	8.88	13.61	18.87	23.12	25.22	24.59	21.34	16.46	11.21	7.01	5.00
BARCEL	15.04	9.16	3.31	6.80	9.65	13.88	18.54	22.25	24.03	23.37	20.42	16.05	11.40	7.73	6.04

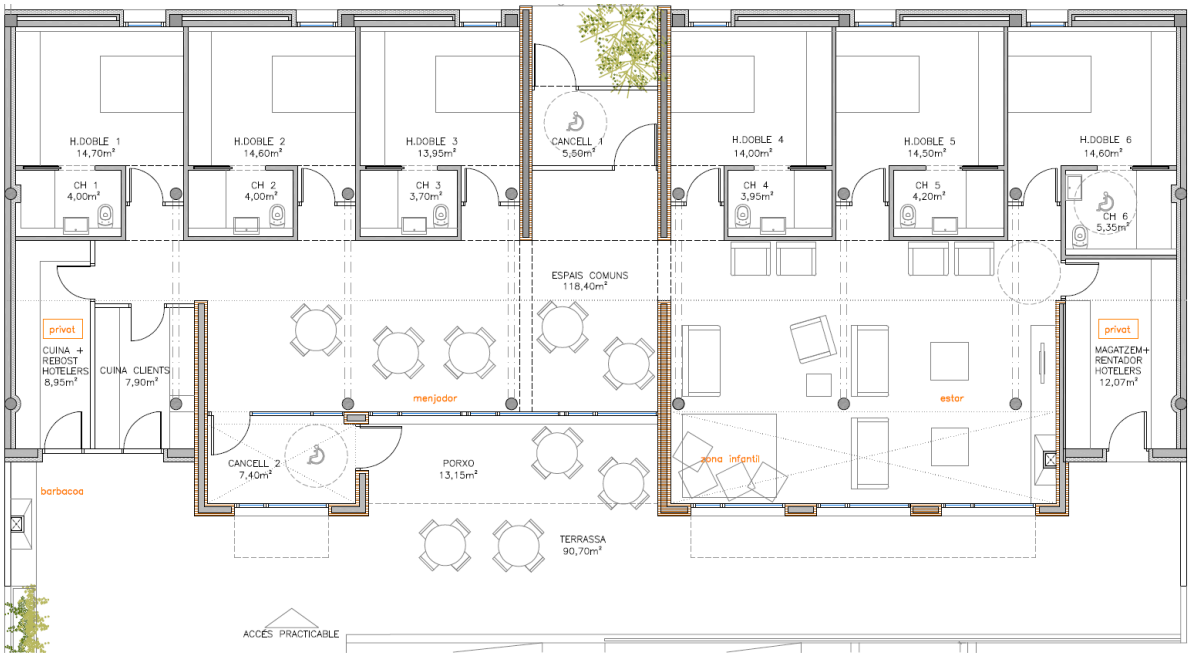


radiation map daily global, annual average (MJ/m2)

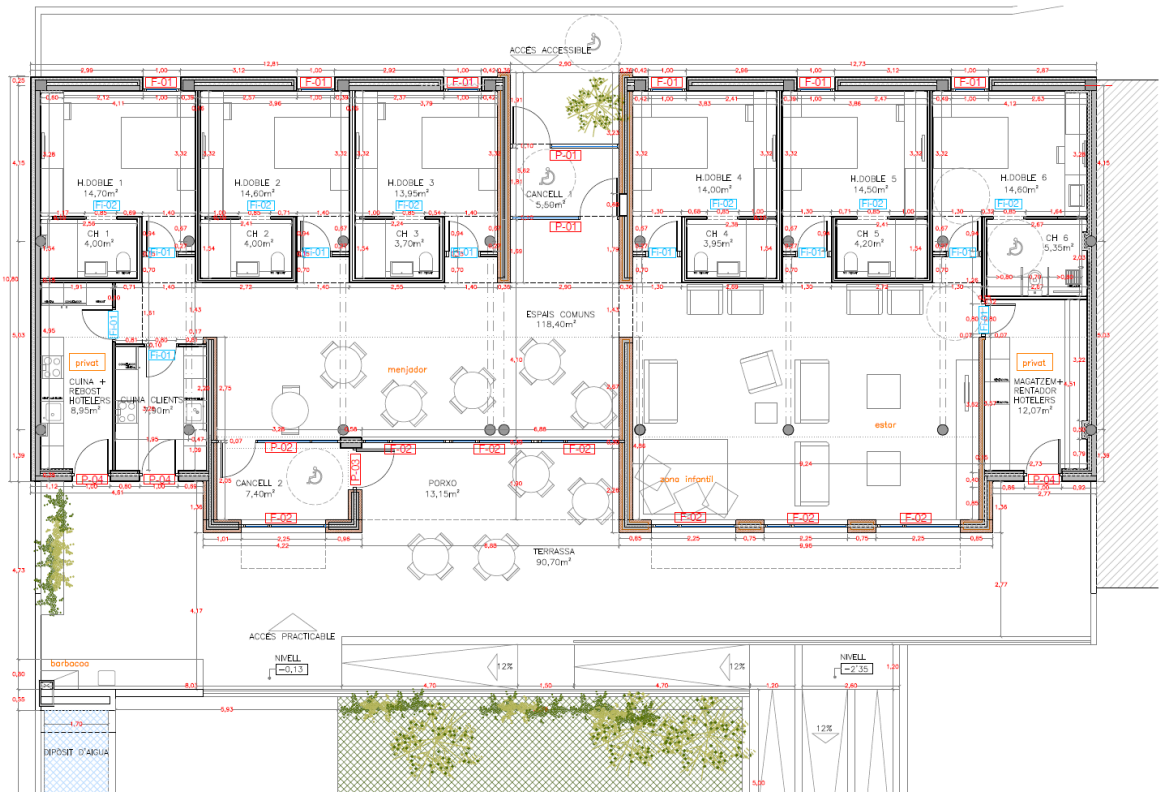
location, capacity and dimensions, envelope condition, emissions (CO_2, noise), energy consumption/production, operating and maintenance costs and whether the current condition meets the needs of its users.

3 Evaluation of potential technical measures

Make a short overview of potential investment scenarios and evaluate it from five different standpoints:
Technical
Legal
Economical
organizational
environmental impact of the investment.



Initial solution



Final solution

Criteria for selection have to be stated in advance in a way that the results of evaluation of each aspect of a scenario can outweigh the results of another one (i.e. environmental over economic). Alternatively, a checklist tool can be used in order to choose a few alternative project ideas for further investigations.

3.1 Technical aspects

Describe principal technology data of the new investment – i.e. types of RES/RUE measures, basic specifications, investment costs, energy consumption/production, operating and maintenance costs or revenues. The outcomes of the technical evaluation, taken into account space and construction characteristics and the simulation of the energy demand/production, form the basics of the legal, economic, organizational and environmental evaluation.

3.2 Legal framework

Specify relevant laws, regulations, planning and environmental permissions which have to be obtained and met to implement the selected technological solution and possible risks associated with them.

3.3 Economic analysis

The economic analysis should examine the financial viability of the investment, specifically:

- Projected revenue streams – savings/incomes from energy savings/production
- Funding sources, subsidies and other assistance available

Based on the principal investment and operational data, a financial analysis has to be made with standard profitability indicators (internal rate of return, net present value, payback period (simple and discounted). Usually the study horizon for the financial viability of investment in energy sectors is at least 20 years or even longer.

3.4 Organizational aspects

Explain if the investment will require investment in education (skill levels), additional hiring or changes of the current organizational scheme.

3.5 Environmental impact

Identify and quantify all positive and negative impacts of the proposed investment solution (i.e. emissions to air, water and soil, level of noise).

4 Conclusions and recommendations

Based on the results of the evaluation of potential technical measures the most cost-effective or environmentally suitable scenario (depending on different priorities of the investor) is recommended for further evaluation in the full feasibility study. Steps which have to be made towards realization of the proposed technical solutions and estimated time schedule can also be given here.